

REMARKS

Claims 14-26 and 31-36 are currently pending with claims 14, 23, 24 and 26 being in independent form. Reconsideration of the Office Action and allowance of the present application and all the claims therein are respectfully requested and now believed to be appropriate.

***Allowable Claims***

Applicants acknowledge and appreciate the Examiner's indication that claim 23 is allowed. Applicants also acknowledge and appreciate the Examiner's indication that claims 17-19, 21, 32-34 and 36 contain allowable subject matter and would be allowed if presented in independent form. However, at this time, Applicants are not presenting these claims in independent form because it is believed that claim 14, from which these claims depend is allowable over the applied art of record.

Furthermore, Applicants again note that claims 23-26 were not specifically indicated to contain allowable subject matter. However, as these claims were again not rejected on the basis of prior art, Applicants are fully justified in believing that these claims contain allowable subject matter. Accordingly, Applicants request allowance of at least claims 23-26 in view of the fact that the indefiniteness rejection is improper. Additionally, Applicants submit that all of the pending claims are in condition for allowance for the following reasons.

***Disclosure Objection***

The specification was objected to because the unit "atoms/cm<sup>2</sup>" in paragraphs [0036] and [0047] is alleged to be incorrect. Applicants do not disagree.

As the Examiner well knows, whereas the correct units for describing a concentration are in "atoms/cm<sup>3</sup>", the correct units for adding or for applying a dose are in "atoms/cm<sup>2</sup>". Indeed, this is clearly described in the very prior documents applied by the Examiner in the instant Final Rejection. For example, US Patent 6,538,278 to CHAU clearly explains the dose units in "atoms/cm<sup>2</sup>" and the concentration units in "atoms/cm<sup>3</sup>" (see col. 5, lines 58-67). US Patent 6,853,037 to KUDO et al. similarly explains that the dosage units are properly presented with units "atoms/cm<sup>2</sup>".

With this in mind, it is clear that paragraphs [0037] and [0047] of the specification utilize the correct units as "atoms/cm<sup>2</sup>". These paragraphs clearly describe the adding of nitrogen with a nitridation step and the dosing of implanted nitrogen.

Accordingly, Applicants respectfully request that this basis of objection be withdrawn.

***35 U.S.C. § 112, 1<sup>st</sup> paragraph, Rejection***

Claim 25 was rejected on the basis of 35 U.S.C. § 112, 1<sup>st</sup> paragraph, as allegedly failing to comply with the written description requirement. Applicants respectfully disagree with the Examiner's assertions.

The Examiner quotes certain language of the claim and asserts that such language lacks support in the specification. Applicants respectfully disagree. As explained above, paragraph [0037] clearly describes the recited second adding of

nitrogen step as one which "may add nitrogen in the range of  $1 \times 10^{13}$  to  $1 \times 10^{15}$  atoms/cm<sup>2</sup>". Although Applicants incorrectly used the units "atoms/cm" in the originally filed application, this was an error that one having ordinary skill in the art would recognize. Indeed, the Examiner correctly noted this error and required Applicants to correct this error in the Office Action of September 19, 2005. Again, as noted above, one having ordinary skill in the art (as demonstrated by the applied prior art documents) would clearly recognize that the dose or adding units are typically in atoms/cm<sup>2</sup>.

Furthermore, while the Examiner has alleged that claim 25 relates to a concentration and must therefore recite the units "atoms/cm<sup>3</sup>", the Examiner has failed to appreciate the fact that claim 25 uses the language "added in the amount". This language clearly refers to the dose used to achieve the concentration and not to the concentration itself.

Accordingly, Applicants respectfully request that this basis of rejection be withdrawn.

### ***35 U.S.C. § 112, 2<sup>nd</sup> paragraph, Rejection***

Claims 24-26 were rejected on the basis of 35 U.S.C. § 112, 2<sup>nd</sup> paragraph, as allegedly being indefinite. Applicants respectfully disagree with the Examiner's assertions.

The Examiner quotes certain language of the claims and asserts that the claims are indefinite. Conspicuously absent from the Examiner's assertions, however, is any explanation whatsoever as to how or why the recited features are indefinite. Applicants note that each feature is discussed in the instant specification on, e.g., paragraph [0025]

and is fully supported by the disclosure. Moreover, Applicants have specified examples of concentrations which would produce the results recited in these claims. Thus, one having ordinary skill in the art, having read the specification and drawings, would have no difficulty in understanding these claims. Nor has the Examiner demonstrated otherwise. Accordingly, Applicants respectfully request that this basis of rejection be withdrawn.

***Rejections Under 35 U.S.C. § 103(a)***

***Over Chau with Kudo***

Claims 14, 15, 20 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,538,278 to CHAU in view of U.S. Patent No. 6,853,037 to KUDO et al. This rejection is respectfully traversed.

The Examiner acknowledged that CHAU lacks, among other features, a second gate dielectric that is thicker than the first gate dielectric. However, the Examiner asserted that this feature is disclosed in KUDO and that it would have been obvious to one having ordinary skill in the art to combine the teachings of these documents. Applicant respectfully disagrees with the Examiner's assertions and traverses this rejection.

Notwithstanding the Examiner's assertion as to what each of CHAU and KUDO discloses or suggests, Applicant submits that no proper combination of CHAU and KUDO discloses or suggests, for example, a first active device formed on the substrate, the first active device having a first gate dielectric, which has a first concentration of nitrogen, and a second active device formed on the substrate, the second active device

having a second gate dielectric, which has a second concentration of nitrogen different than the first concentration of nitrogen, wherein the second gate dielectric is thicker than the first gate dielectric (claim 14).

Applicants acknowledge that CHAU discloses a semiconductor device 200 having a first active device (n-FET 210) formed on the substrate 202, the first active device having a first gate dielectric 220, which has a first concentration of nitrogen 222 or 226 and a second active device (p-FET 250) formed on the substrate 202, the second active device having a second gate dielectric 260, which has a second concentration of nitrogen 264 different than the first concentration of nitrogen. However, CHAU states at col. 4, lines 40-42, that the first gate dielectric 220 has a thickness in the range of 20-50 Å, and at col. 5, lines 1-3, that the second gate dielectric 260 has a thickness in the range of 20-50 Å. While such language arguably discloses or suggests that the first and second gate dielectrics can have the same thickness, this language does not disclose, or even suggest, that the second gate dielectric 260 is thicker than the first gate dielectric 220. Indeed, the Examiner has acknowledged in the Final Office Action that CHAU merely discloses that the second gate dielectric has the same thickness as the first gate dielectric.

Applicants disagree, however, that KUDO cures the deficiencies of CHAU. While it is apparent that KUDO discloses a semiconductor device having a first active device (p-well 13) formed on the substrate 10, the first active device having a first gate dielectric 16a and a second active device (n-well 15) formed on the substrate 10, the second active device having a second gate dielectric 16b, and that KUDO discloses that the second gate dielectric 16b can be thicker than the first gate dielectric 16a (see col.

5, lines 1-11), KUDO does not disclose or suggest that the structure receives any dosage or amount of nitrogen, much less, that one active devices receives a concentration of nitrogen that is different from that of another active device.

Applicants emphasize that KUDO merely discusses various stages of ion-implantation of boron, fluorine and phosphorus (see e.g., col. 3, lines 41-42 as well as col. 4, lines 1-3 and 11-13). There is simply no language in KUDO which even remotely suggests that nitrogen can be substituted for boron, fluorine or phosphorus. As such, KUDO cannot provide any rational basis for modifying CHAU in the manner asserted by the Examiner.

Nor does CHAU and KUDO contain any language suggesting the apparent benefits of using both different concentrations of nitrogen and different thicknesses of gate dielectrics. The only apparent basis for modifying CHAU appears to be Applicants disclosure, which is improper.

Applicant directs the Examiner's attention to the guidelines identified in M.P.E.P section 2141 which state that

"[i]n determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

As this section clearly indicates,

"[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

Moreover, it has been legally established that

"[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) .... Although a prior art device 'may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so. 916 F.2d at 682, 16 USPQ2d at 1432.'" See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references)."

Additionally, it has been held that

"[a] statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the time the claimed invention was made because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993)."

Applicants submit that there is no motivation to modify CHAU in view of KUDO in a manner which would render obvious Applicants' invention, and additionally, Applicants submit that there is no motivation or rationale disclosed or suggested in the applied prior art to modify the applied reference in the manner suggested by the Examiner. The Examiner's opinion simply does not provide a proper basis for these features or for the motivation to modify these documents in the manner suggested by the Examiner. Therefore, Applicants submit that the invention as recited in at least independent claim 14 is not rendered obvious by any reasonable inspection and interpretation of the disclosure of the applied references.

Furthermore, Applicants submit that dependent claims 15, 20 and 22 are allowable at least for the reason that these claims depend from allowable base claim 14

and because these claims recite additional features that further define the present invention.

Applicants request that the Examiner reconsider and withdraw the rejection of the above-noted claims under 35 U.S.C. § 103(a).

Over Chou with Kudo

Claims 14-16, 20, 22, 31 and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,821,833 to CHOU in view of KUDO. This rejection is respectfully traversed.

The Examiner acknowledged that CHOU lacks, among other features, a second gate dielectric that is thicker than the first gate dielectric. However, the Examiner asserted that this feature is disclosed in KUDO and that it would have been obvious to one having ordinary skill in the art to combine the teachings of these documents. Applicant respectfully disagrees with the Examiner's assertions and traverses this rejection.

Notwithstanding the Examiner's assertion as to what each of CHOU and KUDO discloses or suggests, Applicant submits that no proper combination of CHOU and KUDO discloses or suggests, for example, a first active device formed on the substrate, the first active device having a first gate dielectric, which has a first concentration of nitrogen, and a second active device formed on the substrate, the second active device having a second gate dielectric, which has a second concentration of nitrogen different than the first concentration of nitrogen, wherein the second gate dielectric is thicker than the first gate dielectric (claim 14).



Applicants acknowledge that CHOU (see Fig. 5F) discloses a semiconductor device 10 having a first active device (n-FET 14) formed on the substrate 12, the first active device having a first gate dielectric 18C, which has a first concentration of nitrogen and a second active device (p-FET 16) formed on the substrate 12, the second active device having a second gate dielectric 18B, which has a second concentration of nitrogen different than the first concentration of nitrogen (see col. 7, lines 26-33). However, CHOU does not appear to disclose, or even suggest, that the second gate dielectric 18B is thicker than the first gate dielectric 18C. Indeed, the Examiner has acknowledged in the Final Office Action that CHOU merely discloses that the second gate dielectric has the same thickness as the first gate dielectric.

Applicants disagree, however, that KUDO cures the deficiencies of CHOU. As explained above, while it is apparent that KUDO discloses a semiconductor device having a first active device (p-well 13) formed on the substrate 10, the first active device having a first gate dielectric 16a and a second active device (n-well 15) formed on the substrate 10, the second active device having a second gate dielectric 16b, and that KUDO discloses that the second gate dielectric 16b can be thicker than the first gate dielectric 16a (see col. 5, lines 1-11), KUDO does not disclose or suggest that the structure receives any dosage or amount of nitrogen, much less, that one active devices receives a concentration of nitrogen that is different from that of another active device.

Applicants reiterate that KUDO merely discusses various stages of ion-implantation of boron, fluorine and phosphorus (see e.g., col. 3, lines 41-42 as well as col. 4, lines 1-3 and 11-13). There is simply no language in KUDO which even remotely suggests that nitrogen can be substituted for boron, fluorine or phosphorus. As such,

KUDO cannot provide any rational basis for modifying CHOU in the manner asserted by the Examiner.

Nor does CHOU and KUDO contain any language suggesting the apparent benefits of using both different concentrations of nitrogen and different thicknesses of gate dielectrics. The only apparent basis for modifying CHOU appears to be Applicants disclosure, which is improper.

Applicants submit that there is no motivation to modify CHOU in view of KUDO in a manner which would render obvious Applicants' invention, and additionally, Applicants submit that there is no motivation or rationale disclosed or suggested in the applied prior art to modify the applied reference in the manner suggested by the Examiner. The Examiner's opinion simply does not provide a proper basis for these features or for the motivation to modify these documents in the manner suggested by the Examiner. Therefore, Applicants submit that the invention as recited in at least independent claim 14 is not rendered obvious by any reasonable inspection and interpretation of the disclosure of the applied references.

Furthermore, Applicants submit that dependent claims 15, 16, 20, 22, 31 and 35 are allowable at least for the reason that these claims depend from allowable base claim 14 and because these claims recite additional features that further define the present invention.

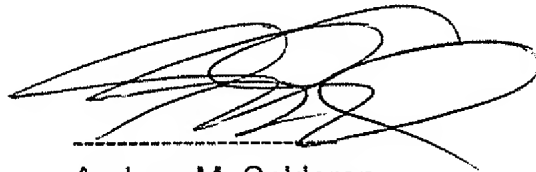
Applicants request that the Examiner reconsider and withdraw the rejection of the above-noted claims under 35 U.S.C. § 103(a).

**CONCLUSION**

In view of the foregoing, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicants hereby make a written conditional petition for extension of time, if needed.

Authorization is hereby given to refund excess payments and charge any additional fee necessary to have this paper entered to Deposit Account No. 09-0456.

Respectfully submitted,  
Jay S. Burnham et al.

A handwritten signature in black ink, appearing to read 'Andrew M. Calderon', is written over a horizontal dashed line.

Andrew M. Calderon  
Reg. No.:38,093

March 20, 2006  
GREENBLUM & BERNSTEIN, P.L.C.  
1950 Roland Clarke Place  
Reston, VA 20191  
(703) 716-1191